NWIFC News

Northwest Indian Fisheries Commission

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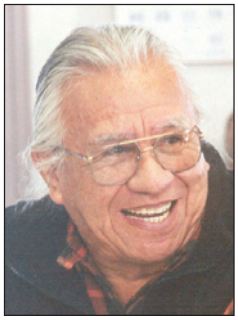
Hatcheries Being Run Better, Smarter



We've finished crunching the numbers, and it looks like tribes released 42 million healthy salmon and steelhead from our hatcheries in 2003. That's an increase of about 500,000 fish from the previous year.

Those releases included about 18 million chum; 12 million chinook; and nearly 10 million coho. We also released nearly 1 million sockeye and more than 1 million steelhead.

This is a good thing, not just because these salmon will be harvested by Indian and non-Indian fishermen, but because hatcheries are a big part of wild salmon recovery efforts in the Pacific Northwest.

I said last spring that the report with more than 1,000 recommendations for reforming hatchery practices in Washington would not be allowed to just gather dust. I'm pleased to let you know that it hasn't.

The tribal and state co-managers are taking action on many of the recommendations in the report developed by the Hatchery Scientific Review Group. The HSRG is an independent panel of scientists that has guided the Hatchery Reform Project since it began more than four years and $28 million ago. They have spent more than three years visiting hatcheries, evaluating their operation and developing recommendations for improved operations at more than 100 tribal and state facilities.

Reforming the world's largest hatchery system hasn't been easy, but it's the right thing to do. We've had to make some tough choices to be sure our hatcheries help, rather than hinder, recovery of wild salmon stocks. Some facilities will be closed. At others, production will be reduced. It might mean a few less fish will be returning for harvest in the short term, but the benefits to wild salmon will last forever.

And that's what hatchery reform is all about: using hatcheries to help recover naturally spawning wild salmon stocks. Yes, we need salmon for harvest, and our system of hatchery reform provides for that. But, as is our tradition, we are putting the needs of the resource first.

Every hatchery sits in a watershed. But instead of operating each hatchery like a salmon factory, the way they used to 30-40 years ago, we are managing our hatcheries as an extension of the habitat each watershed contains. Each watershed is different. That means we are operating our programs on the basis of how many fish – both hatchery and wild – the habitat can support, as well as possible effects to wild salmon in that watershed.

Quality, not quantity, is the watchword in salmon production today. It's not about how many fish a hatchery can produce. It's about the overall health and genetic integrity of those fish. It's about how a hatchery fits with all of the other parts of a watershed.

In a few years, you might not even be able to recognize some hatcheries. Logs and other natural cover are being placed in concrete rearing ponds at some hatcheries to create a more natural environment and help young salmon develop their natural instincts.

It would be wonderful if we didn't have to depend on hatcheries to provide salmon for harvest, but those days are long gone: we've lost far too much good spawning and rearing habitat to rely on natural salmon production for our needs. Well over three-quarters – in some cases as much as 90 percent – of the salmon harvested in Washington today come from hatcheries. That sure doesn't mean we should stop our efforts to protect and restore existing habitat. We need to double that effort if we are going to achieve wild salmon recovery.

Clearly, we need hatcheries. But we can operate them better and smarter, though. We are making the necessary changes. We have centuries of traditional knowledge and good contemporary science to show us the way.

NWIFC News

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Nisqually	360-456-5221
Nooksack	360-592-5176
Port Gamble S'Klallam	360-297-2646
Puyallup	253-597-6200
Quileute	360-374-6163
Quinault	360-276-8211
Sauk-Suiattle	360-436-0132
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Stillaguamish	360-652-7362
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Swinomish	360-466-3163
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On The Cover: Puyallup tribal members Francis John, left, and Steve Dillon return to the river the tribe's ceremonial first salmon. Traditionally, the first salmon caught by tribe is returned to the river following an honoring ceremony. The spirit of the salmon will then return to tell his relatives of the respect he was shown, and lead them back for the tribe to harvest.

Photo: E. O'Connell

Makah Youth Gather More Than Food

In tribal culture, the social aspects of food are as important as the food itself. "One of the most important things about potlatches, funerals and other gatherings is eating together," said Polly McCarty, who taught Makah teens about traditional foods this summer.

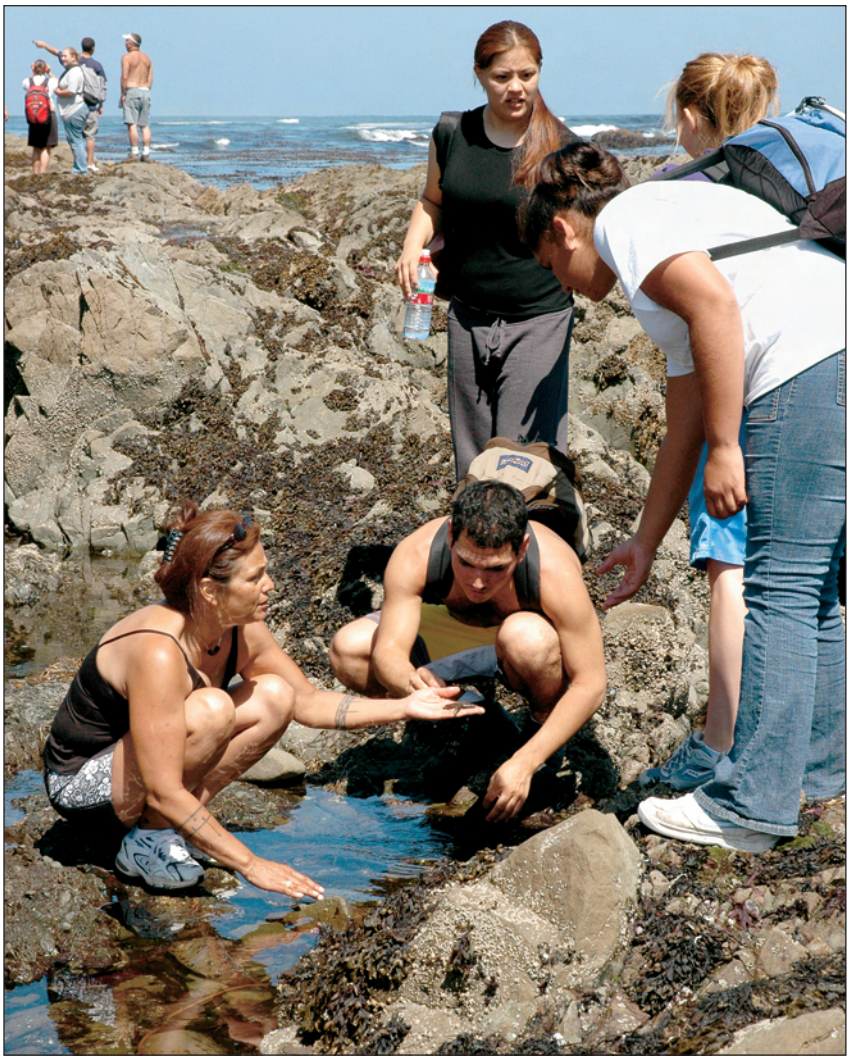
The gathering process itself is another important part of the tradition. McCarty took 10 students on extended hikes throughout the tribe's usual and accustomed gathering areas to collect traditional foods.

"I wanted to show them all the different areas and the foods that are available right here," said McCarty, a Makah tribal member who works at the Makah Cultural and Research Center (MCRC).

Students gathered octopi, mussels, gooseneck barnacles, razor clams and other foods from the intertidal zone, then learned to prepare them at McCarty's home. "They were all laughing and enjoying the food and that's what it's all about. They got to taste their own foods and know that it's right here. They can get it any time they want," said McCarty.

The MCRC paid for the program with a $19,000 grant from the First Nations Development Institute, a private foundation, as well as funds from MCRC. "Our goals were to teach sustainable, traditional food harvest practices; pass on traditional food preparation from the elders; and provide healthy snacks to the senior citizen food program and children's dance group, " said Janine Bowechop, MCRC director.

Some of the teens had never eaten much of the seafood and didn't know how to collect it. "Teenagers aren't known for their willingness to try new things," McCarty said, laughing. "But these kids are really proud of being Makah and that makes them eager to try these foods. I trace some of that pride back to the successful whale hunt."



Polly McCarty, left, displays a sea star to Makah tribal students in a cultural foods summer class. *Photo: D. Preston*

'Even adding a little bit of our traditional foods is better for their diet.'

– Polly McCarty
Makah Tribal Member

The tribe has a treaty-reserved right to hunt gray whales. In 1999 the Makah harvested one gray whale that was eaten by the whole village and thousands of guests. "It brought the whole community together. It helped kids feel real pride in being Makah," said McCarty.

Andrew Crabtree, 17, eagerly soaked up the ways of gathering and preparing foods. "The program was excellent. It was great to see all the locations and eat the food," he said.

"Chiton (a mollusk) was interesting – really chewy," said Kristena Sawyer, a college student who has participated in the summer youth programs for three years. "It's been a great experience."

McCarty hopes the students will regularly incorporate the foods into their diets. "Even adding a little bit of our traditional foods is better for their diet," she said. "My aunt Hildred Ides always said our people would be healthier if we got back to our traditional diet." She is gratified to hear that her students want to teach others the gathering skills. "As a teacher, you can't ask for any better reward than their desire to pass on the knowledge."

"Next year, we hope to expand the program to include more kids," said Bowechop. "We also want to focus on associated healthy activities, like paddling a canoe to a harvest location. Additionally, we want to look at the nutritional benefits of the foods they are gathering." *– D. Preston*

Sockeye Key To Tribal Cultures And Economies

Editor's Note: Each year, tribes eagerly await the return of sockeye salmon, a favorite traditional food and important element of tribal fishing economies. Following are three stories that discuss the role of sockeye in the lives of tribal members and tribal efforts to protect, enhance and restore this valuable resource.

'It's one of those fisheries that gets people excited'

Not far from the Ballard Locks, Suquamish fishermen Bennie Armstrong Jr. and Bob Alexander Jr. are pulling sockeye salmon from their gillnet in the Lake Washington ship canal. For Armstrong, this is his first tribal sockeye fishery. For Alexander, this is one of several tribal sockeye fisheries in which he has participated during the past few years.

"This is the fishery I always fish," said Armstrong.

Every few years, sockeye returns to the Cedar River are abundant enough to allow Suquamish and Muckleshoot tribal fishermen to harvest the prized salmon returning through the Lake Washington ship canal. This year is one of those years.

About 400,000 sockeye salmon passed through the Ballard Locks this summer on their way to Lake Washington and the Cedar River. That left a surplus of slightly more than 50,000 salmon for the tribes and sport fishermen to split evenly. At least 350,000 salmon – the spawning escapement goal – must pass through the Ballard Locks before any Indian or non-Indian fishery can occur.

"It's great that we get a chance to get out there and catch some sockeye this year," said Rob Purser, fisheries director for the Suquamish Tribe. "The sockeye fishery is a big deal for us. It's one of those fisheries that gets people excited."

Along with the Suquamish Tribe, the Muckleshoot Tribe opened sockeye fisheries for its tribal members.

Sockeye salmon are economically and culturally important to tribal members. A portion of the sockeye harvested will be used during special events, and tribal gatherings. A large portion will go to tribal elders, unable to participate in the fishery.

"It was great that we had an opportunity to do that for them," said Jon Oleyar, marine fish biologist for the Suquamish Tribe. "The elders really appreciate the chance to eat traditional food, such as sockeye. It wasn't the largest sockeye return we have seen, but it was strong enough to get us out there fishing, which is the important thing. It was a good year because everyone – Indians and non-Indians – had a chance to get out on the water and catch some sockeye." *– D. Friedel*

Suquamish fishermen unload their Lake Washington sockeye catch at the Shilshole Bay Marina in Ballard. *Photo: D. Friedel*

Quinault Indian Nation Fertilizes Lake To Jump Start Sockeye Production

The Quinault Indian Nation is using a multi-faceted program to improve sockeye returns to the Quinault River watershed, including fertilizing Lake Quinault. Sockeye populations in the lake began to decline in the 1950s, a trend that accelerated alarmingly in the early 1990s.

"The causes of the decline of sockeye numbers were not obvious," said Larry Gilbertson, chief fisheries scientist for QIN. "We looked at harvest data and spawning levels and it was clearly not harvest-related. Freshwater production bottlenecks were the major problems we identified."

Two freshwater habitats are important to sockeye, also known as blueback: the upper Quinault River and its tributaries where a majority of the fish spawn, and Lake Quinault. Intensive study of 100 years of history of the upper river revealed that its channel was more unstable over the past 25 years than at any other time. Rapid lateral movements of the channel eliminated important side-channel habitat that adults prefer for spawning, reducing the watershed's overall production.

Young sockeye linger in Lake Quinault for one to two years before heading to sea; adults spend anywhere from three to 10 months in the lake before spawning. "The lake is a crucial link in the life cycle of our sockeye," said Bill Armstrong, QIN fisheries biologist.

The QIN monitored the lake for four years to establish seasonal levels of lake productivity and determine whether nutrient levels

(Continued, Next Page)

Quinault Indian Nation (QIN) fisheries technicians pump a nitrogen and phosphorus fertilizer mix into Lake Quinault to boost sockeye production. *Photo: D. Preston*

could be enhanced to improve biological productivity. The study showed that the lake is nutrient poor. Low levels of phosphorus and nitrogen limit production of phytoplankton (microscopic water plants). Low phytoplankton levels limit populations of zooplankton (microscopic animals), which is the main food for young sockeye.

QIN biologists hope that fertilizing the lake with phosphorus and nitrogen will jump-start production of the tiny organisms important as food for sockeye.

"No one thing was going to improve sockeye populations by itself," said Gilbertson. "Information from all of our studies dictated improving food availability in the lake, then improving habitat in the upper river with some restoration efforts."

Early results of fertilization at Lake Quinault are encouraging, said Gilbertson. "We are seeing an increase in the microscopic plant numbers, but that's preliminary. We'll have a better idea after our second season of fertilizing."

Initial plans call for fertilizing the lake for five years from early spring into early fall, coupled with continuous monitoring.

Since 1999, QIN has released 1 million sockeye annually from its Lake Quinault Hatchery. "This is a temporary measure. We only want to supplement these stocks until natural production levels are achieved," said Gilbertson.

Meanwhile, an improvement in ocean conditions has resulted in strong returns of sockeye the past three years, displaying the stock's resiliency if given the right conditions. It's been a boon to tribal fishermen and the QIN community: a reminder of what a stable return of sockeye means to the tribal economy.

"Quinault sockeye are in big demand and could easily be as celebrated as Copper River salmon – but the key to marketing is reliability. Stabilizing this stock would ripple through the economy in a very positive way," said Gilbertson. – *D. Preston*

New Sockeye Marking Technique To Dye For

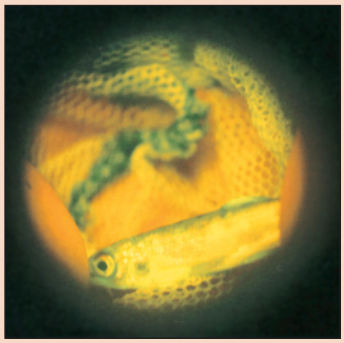
Some hatchery-reared Lake Ozette sockeye are getting a dye job to distinguish them from their wild cousins. The Makah Tribe is conducting a trial of a new way to mark fish that is less harmful than traditional fin clipping. The method uses calcein, a harmless dye that glows under a special light.

"This could be cheaper for us and is better for the fish," said Joe Hinton, manager of the Makah Tribe's Hoko Hatchery.

Though the antifreeze-green colored dye looks ominous, it is invisible after application and is harmless to fish and people. It's also better for the fish than having their fins clipped.

"Fin clipping requires a lot of handling for young fish. It creates stress on the fish, it's labor intensive and it's expensive. Also, after adult fish have returned to spawn and die, decomposition can make it difficult to tell if the fish is fin-clipped or not," said Hinton. The other advantage to using the dye is being able to mark very young fish that are too small to adipose clip.

Lake Ozette hatchery sockeye, which are reared from eggs taken from wild stock, also receive another special mark before release. By varying water temperature levels during rearing, a mark similar to growth patterns in tree rings is left on the fish's ear bone or otolith. While the mark is helpful to identify hatchery fish after they return as adults to spawn and die, it can't be used to count young hatchery origin fish as they leave the lake because it requires killing the fish to detect it. The dye, on the other hand, provides a non-lethal way to identify hatchery fish, which is an important management tool.



Dyed fin areas on a young sockeye glow under a special scope. *Photo: D. Preston*

As a control measure, the fish will also be fin clipped until the dye performance in both smolts and returning adults is evaluated. Marking hatchery-produced sockeye is necessary because wild Lake Ozette sockeye are listed as "threatened" under the federal Endangered Species Act.

This summer, fisheries technicians marked 13,000 fish with the dye. The dye glows under a special light, particularly lighting up the fins of the fish because it binds to the bony structures. The dye can't be seen without the special $4,000 light, which the Washington Department of Fish and Wildlife (WDFW) loaned to the Makah hatchery.

"It allows non-lethal sampling, it clearly marks all the hatchery fish and it's cheap," said Caroline Peterschmidt, project biologist for the Makah Tribe. WDFW and other tribal restoration programs are also testing this marking technique. – *D. Preston*

Joe Hinton, manager of the Makah Tribe's Hoko Hatchery, prepares to rinse sockeye fry that have been doused with a non-toxic dye. *Photo: D. Preston*

Pocket Estuaries Critical For Chinook

The key to big salmon runs may lie in small sections of habitat, scientists at the Skagit River System Cooperative (SRSC) are finding.

According to the tribal consortium's research, pocket estuaries are exceptionally important for the imperiled Skagit River chinook salmon.

"Our research is designed to reach one goal: the recovery of Skagit River chinook salmon," said Lorraine Loomis, fisheries manager with the Swinomish Tribe. Skagit River chinook are listed as "threatened" under the federal Endangered Species Act. "This pocket estuary work has a lot of promise, and could help us toward that goal."

SRSC is the natural resources arm of the Swinomish and Sauk-Suiattle tribes. For the past 10 years, scientists at SRSC (and its predecessor, the Skagit System Cooperative) have been studying every aspect of chinook salmon life history in the area. Learning how salmon fry migrate through the Skagit River delta, for example, has revealed that lost delta habitat and pocket estuaries are significantly limiting how many chinook the river can produce.

The tribal natural resources organization is now finding that, in the marine waters around the Skagit River delta, chinook congregate in pocket estuaries. A pocket estuary, like its larger counterpart, is a partially enclosed marine body of water where the salt water is diluted by freshwater. The difference is that pocket estuaries are much smaller – some in the Skagit basin are 4 acres or less. Chinook and other fish simply love pocket estuaries, using these sheltered habitats to feed, hide from predators, and prepare for their transition to the open ocean.

Because these areas are often low-bank waterfront property, though, people love pocket estuaries too – and love them to death in many cases. Of the 114 such sites that SRSC has identified, development has devastated about 80 percent.

"This work will help us figure out what kind of pocket estuaries salmon prefer to use, where productive pocket estuaries used to be, and where they could be in the future," said Aundrea McBride, a research ecologist with SRSC. "That will reveal possible restoration opportunities in the future."

The SRSC study, now in its second year, covers an area stretching from Deception Pass in the north to Possession Sound in the south. To cover this wide swath of nearshore habitat, SRSC has teamed up with the Tulalip, Stillaguamish and Samish tribes. The tribes are monitoring 11 productive pocket estuaries intensively throughout the year; approximately 30 other sites will also be tested, though not as regularly. For points of comparison, they are also monitoring three pocket estuaries that have been destroyed by development to see if fish are still trying to use those sites. They will continue sampling through June.

Shawn Beasley, SRSC technician, beach seines a pocket estuary as part of study to assess its health. *Photo: J. Shaw*

"By learning about salmon use patterns – what pocket estuaries they use and why – we can prioritize our restoration efforts better," said McBride. "We hope this research will be a foundation for establishing habitat preservation priorities in other regions as well."

Researchers stress that pocket estuaries, however important, are not the lone silver bullet for salmon recovery.

"Pocket estuaries are not a replacement for lost delta habitat; the total acres of pocket estuaries in Whidbey Basin are not even close to the acres of delta habitat that could be restored," said McBride.

The combined project is funded by a $40,000 grant from the Northwest Straits Commission. – *J. Shaw*

Generations

Sam Pe-ello, a Nisqually tribal member, pilots a canoe down the Nisqually River in the 1880s. The Nisqually Tribe historically inhabited several villages throughout the Nisqually River watershed and used canoes as a primary method of transportation. *Photo: Courtesy of the Nisqually Indian Tribe Archives.*

Pact Paves The Way For Removal of Elwha Dams

The Elwha Dam, shown here, as well as the upstream Glines Canyon Dam, are slated for removal from the Elwha River beginning in 2008. *Photo: D. Friedel*

After 30 years of debate, the final steps have been taken toward tearing down two dams on the Elwha River, raising hopes that salmon populations will once again return in great numbers to the Olympic Peninsula stream.

The Lower Elwha Klallam Tribe, the City of Port Angeles and the National Park Service in August signed a historic pact giving the go-ahead for the removal of the Elwha and Glines Canyon dams. The removal process will begin in 2008 and will take two to three years.

"This has been a career-long project for me; a project that has been very worthwhile," said Robert Elofson, the tribe's Elwha River restoration program director. "I'll probably be close to retirement when salmon begin to return to the Elwha River and we can start harvesting some fish."

The recently signed agreement maps out how the $182 million Elwha River Restoration Project will take place. Part of that project includes the removal of the river's 210-foot Glines Canyon Dam and the 108-foot Elwha Dam – the largest dam removal project ever in the United States.

The removal process will take place in stages. Slowly deconstructing the dams is necessary because an estimated 17 million cubic yards of sediment has piled up behind the two structures over the years. The piece-by-piece removal process will allow some of that sediment to flow into the Strait of Juan de Fuca, while the rest will stay behind and help form a new landscape after lakes Aldwell and Mills slowly drain into the ocean and disappear.

'I hope people realize how significant this project is.'

– Robert Elofson
Lower Elwha Klallam Tribe

As the dams are removed, the landscape downriver also will be altered. To offset the rising water table and increased sediment in the river, the recently signed deal includes the construction of a new fish hatchery that will be built on the tribe's reservation near the mouth of the river. An existing levee also will be raised to protect the reservation from floods. The City of Port Angeles will get a new water treatment plant on the river.

When the project is complete, about 70 miles of essential spawning and rearing habitat for fish once again will be accessible. The Elwha River was once the home of legendary salmon runs. But in the early 1900s, the Olympic Power Company constructed the Elwha Dam without fish passage, breaking state law and decimating the river's fish populations. Over the years, salmon returns that once reached nearly 400,000 annually have been reduced to about 5,000 fish.

Small populations of chinook, coho, chum and pink salmon, as well as steelhead, bull and cutthroat trout still exist in the river. The chinook and bull trout populations are listed as "threatened" under the federal Endangered Species Act.

After the project is finished, tribal biologists are hoping to see greater returns of salmon returning to the Elwha after eight years, said Elofson. The tribe will monitor the river and nearshore environment, and document the effects of the increase in sediment and the overall dam removal process on fish and vegetation. Plus, the tribe plans to halt fishing at the mouth of the river until salmon and trout populations adequately recover.

"I hope people realize how significant this project is," Elofson said. "This area will once again have a productive salmon stream just a few miles from the middle of downtown Port Angeles."

Lower Elwha Klallam tribal members have lived near the mouth of the Elwha River for thousands of years. The river is economically and culturally significant to tribal members, said Elofson.

"When those dams are gone and the river is once again a healthy home for salmon, there will be a great amount of joy among the tribal members," Elofson said. "This is an extremely important project not only for the tribe, but for the entire community." – *D. Friedel*

Nature's Invaders

Non-Native Plant May Harm Wildlife

Jeremiah Johnson, Makah Tribe wildlife technician, pulls tansy ragwort, a toxic weed that can kill deer and elk. *Photo: D. Preston*

The Makah Tribe is working to eradicate a poisonous daisy look-alike that can kill deer, elk, and livestock.

Tansy ragwort is a well documented threat to livestock. While livestock don't choose to eat ragwort, it can accidentally get mixed in with hay during harvest. Toxin in the weed kills the animal over time by destroying the liver. Tansy ragwort is native to Europe, but began invading the United States decades ago. Each plant can produce up to 150,000 seeds.

"While it isn't documented that elk eat tansy ragwort, we don't know for a fact they don't eat it," said Rob McCoy, wildlife biologist for the Makah Tribe. "Domestic cows are fenced in and observed regularly. But when elk die, we don't always know the cause." Equally disturbing to wildlife biologists is the proliferation of the invader, replacing native vegetation that elk and deer prefer to eat.

Eliminating the rogue weed requires sweat. The only way to effectively kill the plant is to pull it just before it turns to seed in early summer. "The weed uses a lot of energy to flower, so it can't re-establish if we pull it now," said Jon Gallie, wildlife biologist for the Makah Tribe. A moth that kills tansy ragwort is found on the Olympic Peninsula, but not in sufficient numbers to control the prolific weed.

Tansy ragwort pulled recently by wildlife technicians, biologists, and tribal students had root wads up to a few feet in diameter. Thousands of plants were burned, one of the few ways to make sure the plant doesn't re-seed because seeds remain viable for up to 10 years. Crews pulled weeds on more than 135 acres, both on reservation and, with permission, on Crown Pacific's private timberlands.

"This will be a multi-year effort," said McCoy. "The plants live for two years, developing a flower the second year. The flowering plant is easy to find. The first-year plants don't have flowers and are so small, it's hard to pull the root. We'll have to re-visit these areas next year to help keep the tansy population down."

– D. Preston

Mosquitoes Trapped To Monitor For Virus

It's not a matter of if, but when West Nile virus makes an appearance in Clallam County, federal health officials say. When it does show up, people will know about it thanks to the Makah Tribe.

The Makah Tribe is participating in a statewide program to test for the presence of the virus. Tribal technical staff set a trap for mosquitoes every two weeks from the end of April through September. The traps use carbon dioxide as a lure for the mosquitoes, mimicking the exhaling of warm-blooded animals that female mosquitoes seek. The insects are preserved and sent to a state lab for analysis

Vincent Cooke, Makah Tribe environmental division manager, hangs a mosquito trap near the tribe's office buildings. *Photo: D. Preston*

"Last year, we were looking for information about whether the virus was present in Clallam County and found out there wasn't any local testing," said Vincent Cooke, environmental division manager for the Makah Tribe. "We contacted the state health department and they were happy to have us participate in the monitoring program."

Mosquitoes get West Nile virus by biting infected birds. The only way humans can get the virus is by being bitten by an infected mosquito. Most humans who get the disease experience mild flu-like symptoms. The more serious case of the disease can affect the nervous system, causing paralysis and death. In the 10,000 cases of West Nile virus reported in 2003, 262 people died. Those most at risk are young children and the elderly. On the West Coast, many cases are being reported in California. Oregon recently reported its first case.

> **'It's only a matter of time before we get it out here.'**
> *– Vincent Cooke*
> *Environmental Division Manager*
> *Makah Tribe*

State health officials suggest wearing long sleeves and pants if you are out at dawn or dusk, prime mosquito time. Insect repellent containing DEET is also helpful, but is not recommended for children under the age of 2.

Officials are also asking residents to get rid of standing water outside to reduce breeding places for mosquito larvae.

"It's only a matter of time before we get it out here," said Cooke. "Knock on wood, but we haven't seen it so far." *– D. Preston*

Highway Project's Effects On Fish Concerns Hoh Tribe

The Hoh Tribe's relationship with the 55-mile long, glacier-fed Hoh River goes back centuries. It is the thread of life from which the salmon comes. Salmon sustains the tribe. Both depend on a healthy Hoh River.

That's why the Hoh Tribe is taking an active part in the $7.1 million Highway 101/ Hoh River construction project. The Washington Department of Transportation (DOT) is heading the project being paid for by federal highway funds. The colossal project is creating the largest known man-made logjams to coax the river away from the highway in a way that protects the road and enhances fish habitat.

The Hoh Tribe is working to mitigate effects to fish from a colossal project to protect Highway 101 from the Hoh River. *Photo: D. Preston*

A stretch of Highway 101 15 miles south of Forks has been eroded several times in the past decade and millions of dollars have been spent to protect it. Even as the current project was being planned in 2003, more than 2 feet of rain fell in October, causing DOT to dump 1,000 truckloads of huge boulders (rip-rap) in the river to protect the road.

"In that sense, this is the lesser of two evils," said Rod Thysell, natural resources director for the Hoh Tribe. "If they didn't do this project, it would mean thousands more truckloads of rip-rap to protect the road. From a fish habitat perspective, that's just not an option."

Rip-rap speeds the river's flow, eliminating pools important to fish. In addition, rip-rap prevents a river from creating logjams that are important elements of fish habitat. Over time, miles of rip-rap create a straight river channel devoid of the natural bends, eddies and holes which help control flooding and fish need to survive and thrive.

Large, stable logjams, however, provide deep pools that fish need for cover and to rest. Over the past 50 years, extensive logging on 30 miles of the Hoh River valley has dumped tons of sediment into the river that accelerates rapid, destructive side-to-side movement by the river, especially during floods.

To stabilize the river's channel, four of 10 engineered logjams will rise 25 feet above the river and be anchored an additional 15 feet below the surface. Nearly 500 trees, some with their large root wads intact, will be integrated in all of the logjams, as well as large boulders. The tops of the logjams will be planted with young trees to jump-start natural growth.

The river, now diverted by a temporary dam, is flowing through a previous channel re-created by construction. The plan is for the river to use both channels when the project finishes Oct. 1.

The project's effect on adult fish is murky. Tribal biologists want to make sure that adult spring and summer chinook are moving through the project area.

Tribal biologists are also nervous about whether the project will be completed before heavy fall rains begin. "The project is using the best available science, and hopefully, these short-term losses of fish habitat will be mitigated by the gains in habitat in the long run," said Thysell. "But there are a lot of what-ifs associated with a project like this. The river is full of surprises."

"It all looks good on paper. But the Hoh River hasn't read the paper," said Bob Howell, longtime Forks resident and Timber, Fish and Wildlife technician for the Hoh Tribe.

– D. Preston

River Threatens Hoh Tribal Housing

The Hoh Tribe is used to the ugly mood swings of the Hoh River. Historically, when the Hoh River would flood, tribal members moved to a different camp, returning when the waters receded.

Today, the tribe can't do that. They are constrained to a 443-acre reservation that the river has reduced by many acres over the years. Most of the lower part of the reservation lies within the 50-year floodplain; homes and tribal buildings on the reservation have been repeatedly flooded.

The idea of relocating parts of the reservation is supported by a recently conducted study of the Hoh River's channel migration. The river's trends over the past 100 years show that the main channel will likely migrate through the tribal center within the next 25 to 40 years.

The study suggests the best solution for the tribe and salmon in the river is to relocate. Other alternatives, such as building huge levees, would be expensive and would damage fish habitat.

"Without more land, we can't build anymore," said Mary Leitka, Hoh tribal chairwoman. "We have to be able to build for the future of our children." In 1969, there were 62 Hoh tribal members. Today, there are 102 who live on the reservation; many others would make the move if housing and more jobs were available. Those living in the village are mostly young. Fifty percent of the population is under the age of 20, according to the 2000 U.S. Census.

"The river is our life, so we have to stay connected to it. But our first concern is protecting the people," said Leitka.

– D. Preston

Hoh tribal housing is threatened by the Hoh River. *Photo: Hererra Environmental Consultants, Inc.*

Diatoms Illustrate Habitat History Of Johns Creek

The Squaxin Island Tribe is studying diatoms – tiny one-celled organisms – from the wetland source of Johns Creek to discover how the stream has changed over the past few decades. "Different types of diatoms take root under different conditions," said John Konovsky, water quality manager for the Squaxin Tribe. "By studying which diatoms were prevalent in the past we can determine how the habitat has changed."

When diatoms die, their shell-like bodies stay intact and settle to the bottom of the wetland, so researchers can not only see what current habitat conditions are but also how they have changed over time. Tribal researchers will canoe through the creek's upper wetlands, taking 4-foot core samples along the way. Those 4 feet can take the tribe back decades into the creek's history.

Compared to higher forms of life, such as insects or fish, diatoms give a much clearer picture of what has been going on in the creek. "Fish eat bugs, so it's easy to say that if there are a lot of different kinds of bugs, that fish would also be healthy. But diatoms are much more precise than that," said Konovsky.

"The assumption is that lower levels of life respond more readily to environmental changes. Diatoms aren't focused on one aspect of habitat; they respond to everything we throw at them," he said.

The tribe's diatom study is part of a larger investigation of habitat conditions on Johns Creek. Last fall the tribe mapped water temperatures on several streams, including Johns Creek, using infrared technology. Forward Looking Infrared Radar allows researchers to find hotspots in surface water temperatures and gives them access to the full picture of water temperature throughout the stream.

John Konovsky, water quality manager for the Squaxin Island Tribe, collects diatom samples from the bottom of Johns Creek. *Photo: E. O'Connell*

Unlike most major river systems in western Washington that have glacial or mountain sources, practically all of the streams in the tribe's traditional fishing area originate in wetlands. The more the tribe looks into the unique way that these streams behave, the better they can prevent them from being degraded. "We're developing a way to determine the biological health of these wetlands," said Konovsky.

Coho salmon, which spend a much longer time in fresh water as juveniles than other salmon, have especially been affected by habitat degradation. "Protecting and restoring habitat is the most important thing we can do to recover declining salmon populations," said Jim Peters, natural resources director for the Squaxin Tribe.

– E. O'Connell

Restored Water Flows Will Benefit Fish, Community

A federal order that requires Tacoma Power to increase water flows on the North Fork of the Skokomish River will help repair essential spawning and rearing habitat for threatened fish, says the Skokomish Tribe.

Water from the north fork of the Skokomish River flows through the Cushman hydroelectric powerhouse. *Photo: D. Friedel*

On June 21, the Federal Energy Regulatory Commission (FERC) amended a new license for Tacoma Power's Cushman hydroelectric project in Mason County. As part of that order, FERC granted a motion by the Skokomish Tribe requiring Tacoma Power to promptly begin releasing a minimum water flow of 240 cubic feet per second (CFS) into the north fork of the Skokomish River. FERC had previously only required 60 cfs, and exempted Tacoma from releasing more water during appeals.

"FERC's ruling will begin re-establishing fish habitat that has been lost for 75 years," said Dave Herrera, fisheries director for the Skokomish Tribe. "This is just another step toward repairing critical spawning and rearing habitat for struggling fish populations in the area. This is good news for all the communities along Hood Canal."

Puget Sound chinook salmon, Hood Canal summer chum salmon and bull trout are all listed as "threatened" under the federal Endangered Species Act; all three are present in the Skokomish River watershed.

A big reason for the decline in those fish populations is the loss of habitat due to the Cushman hydroelectric project. Built in the early 20th century, the hydroelectric project's two dams completely block fish passage to habitat. The project also dried up the North Fork of the river for nearly 75 years, degrading habitat that once sustained runs of salmon and steelhead.

Before the arrival of non-Indian settlers, the Skokomish Indians, and their predecessors the Twana, lived in seasonal camps and winter villages throughout Hood Canal; one of the tribe's largest villages was located on the North Fork of the Skokomish River.

"Tacoma has been operating this project since the early 1900s without any habitat protection measures in place," Herrera said. "FERC's ruling is a step toward changing that."

– D. Friedel

Supplementation Aids Chinook Survival

Standing waist-deep in the Sol Duc River, Dean Jackson slides a thrashing 30-pound king salmon into a plastic mesh tube. Whipsawing its tail, the big king soaks the Quileute tribal fisheries technician, displaying the strength it has acquired through eons of evolution.

The Quileutes, along with the Stillaguamish and other tribes, are working to preserve weak wild summer chinook runs and their genetic traits by hand-spawning, or supplementing the stocks.

The goal of Quileute tribal fisheries staff is to capture 50 males and 50 females in late July to mid-September. The live fish are transported to the Washington Department of Fish and Wildlife's (WDFW) Sol Duc Hatchery, where, under a cooperative agreement, the tribe uses the hatchery for a portion of their enhancement efforts.

Supplementation of the wild run of summer chinook began about 20 years ago when the Quileute Tribe saw numbers of chinook dropping sharply. "Historically, it's not a strong run. The numbers are variable," said Roger Lien, fisheries biologist for the Quileute Tribe. "Numbers were low enough then that the tribe saw the run as a good candidate for supplementation."

Supplemented chinook, which are reared in a hatchery, survive in higher numbers early in their lives because of the sheltered environment and abundance of food. This usually leads to higher adult returns than fish that spawn in the wild.

Eggs from returning female chinook are fertilized by sperm from males arriving in the river at the same time. The fertilized eggs remain at the state hatchery for a few weeks before being transferred to the Quileute Tribe's Lonesome Creek Hatchery in LaPush. In June, between 80,000 and 100,000 young chinook were released in the Sol Duc River to begin their ocean migration. They return as adults in four to six years.

Dean Jackson, right, Quileute tribal fisheries technician, and Dahnielle Buesch, tribal hatchery manager, prepare to transport a wild summer run chinook for spawning. *Photo: D. Preston*

Returns of the wild summer run overlap with a state-introduced spring chinook hatchery run. The tribe is collecting genetic material from the fish in hopes of securing funding to determine if there is still a genetic difference between the two fish runs. "There is some mixing of the fish, but we don't know to what extent," said Lien.

"The state has talked about closing the Sol Duc Hatchery, but we're concerned that because these two runs overlap, the hatchery run may be propping up the numbers of the wild run. Without those hatchery fish, the wild summer chinook run could crash," said Mel Moon, natural resources director for the Quileute Tribe. "There is a substantial cost to getting the answers to these questions. To get an accurate read on our recovery goals, we need a lot more information."

Like the Quileute Tribe, the Stillaguamish Tribe also has been supplementing wild summer run chinook for the past 20 years.

"The broodstocking program is designed strictly to supplement the wild run," said John Drotts, natural resources manager for the Stillaguamish Tribe.

Puget Sound chinook are listed as "threatened" under the federal Endangered Species Act.

"After the ESA listing, this work became all the more important," Drotts said.

"One of the major limiting factors is habitat. The habitat we have can only support so many fish," said Drotts. "Broodstocking helps protect fish populations against habitat disruptions."

– D. Preston & J. Shaw

Jason Griffith, Stillaguamish tribal biologist, hefts a summer chinook from the Stillaguamish River. *Photo: J. Shaw*

Salmon Time Trials Help Tell Effects Of Pollution

The Puyallup Tribe of Indians is discovering how long it takes a chinook salmon to travel from Mount Rainier to Commencement Bay. The residence timing study will give the tribe clues about how chinook might be harmed by the Puyallup River's polluted waters.

"We don't know a lot about how long these salmon are staying in polluted areas," said Char Naylor, water quality manager for the tribe. "We think chinook probably reside there for awhile, but we just don't know."

Water quality in the lower Puyallup River is impaired by several sewage plants and stormwater runoff from hundreds of miles of paved surface in the watershed.

A few months ago, the tribe marked almost 2,000 chinook and released them in the upper reaches of the Puyallup River, near the border of Mount Rainier National Park. As the fish make their way downstream the tribe hopes to catch them in a series of beach seines in the lower river.

Christen Williamson, left, and Terry Sebastian, Puyallup tribal biologists, process juvenile salmon as part of a residency timing study. *Photo: E. O'Connell*

'Restoring healthy populations of chinook is our highest priority.'
– Joe Anderson
Fisheries Manager
Puyallup Tribe

The tribe is also marking chinook from other parts of the river that show up in the seines, and seeing if they show up in later samples. "This will give us an idea what chinook from other parts of the watershed are doing," said Russ Ladley, resource protection manager for the Puyallup Tribe. "If any of these salmon stay anywhere for awhile, we know that pollution is likely hurting them more than if they just cruised through."

"The condition of freshwater habitat – from the availability of food and habitat to pollution – plays a large role in how successful these salmon are," said Naylor. Puyallup River chinook are listed as "threatened" under the federal Endangered Species Act.

In addition to finding out how pollution affects salmon, the tribe is also collecting some basic, but important, habitat data. "We already have a pretty good understanding of the overall salmon population in the river. We're trying to find out where they spend their time," said Ladley. "With that information, we can better protect them and their habitat."

The lower Puyallup River, in addition to being the most polluted section of the river, has little habitat available to juvenile salmon. "Young salmon usually live in side channels, logjams, and anywhere there is food and cover from predators," said Ladley. "But, because of diking along the lower river, that kind of habitat is rare. That's why it is important to find where young salmon are and protect that habitat."

"Restoring healthy populations of chinook is our highest priority," said Joe Anderson, the tribe's fisheries manager.

– E. O'Connell

People, Fish Harmed By Litter Along Elwha River

Trash dumped along the Elwha River is raising health and safety concerns for local residents.

Items found along the river include abandoned automobiles, appliances, construction materials, engine oil and everyday household trash. A lot of the trash eventually makes its way into the river during high water flows. Recently two submerged automobiles were pulled from the river.

"Engine oil and fuel left in those cars can cause a serious problem in the river," said Mel Elofson, assistant habitat manager for the Lower Elwha Klallam Tribe. "It's a problem that doesn't just harm fish and wildlife, but also humans. A large portion of the trash near the river is next to the City of Port Angeles' water well."

Clean water is a necessity for city residents, and is vital in the effort to help restore struggling salmon populations in the Elwha River.

The tribe is working with federal, state and local agencies to repair habitat within the Elwha River watershed, helping to restore fragile salmon stocks.

"All this restoration work that the tribe, the State of Washington and other local agencies have been doing to make the river a healthy place for people and salmon is being ruined," Elofson said.

Anyone witnessing someone dumping trash along the Elwha River should contact the local authorities.– *D. Friedel*

Mel Elofson, Lower Elwha Klallam Tribe, displays trash dumped along the Elwha River. *Photo: D. Friedel*

Oxbow Project Creates Salmon Rest Stop

Just like tourists pulling over for a cup of coffee, young salmon need places to get out of the main flow of a river to rest and feed.

"In a natural river system, juvenile salmon use slow water areas just off the main river channel to feed and grow before they leave for the open ocean," said Russ Ladley, resource protection manager for the Puyallup Tribe of Indians. "Restoring these areas is one of the most significant things we can do to recover salmon in the Puyallup River."

This summer the tribe and the South Puget Sound Salmon Enhancement Group (SPSSEG) began to reconnect one of these rest areas – the 96th Street Oxbow – to the river's main channel by widening a culvert and digging an almost 200-foot long channel. The oxbow, once part of the river's main channel, will act a refuge for young salmon. "Oxbows, side channels and other off-channel areas are filled with aquatic insects that are an important food for young salmon," said Lance Winecka, project manager for the SPSSEG.

Paul Tappel, a consulting engineer, stands in front of a channel being dug between the mainstem of the Puyallup River and an oxbow that will provide habitat for juvenile salmon. *Photo: E. O'Connell*

"Rivers naturally create these off-channel areas when they overflow their banks, carving new channels," said Winecka. "Places like the 96th Street Oxbow are important places for the survival of juvenile salmon." The project will especially benefit coho and chinook salmon, and cutthroat and steelhead trout, all of which live in freshwater for a extended period as juveniles. Puyallup River chinook are part of a wider stock listed as "threatened" under the federal Endangered Species Act.

"If we were to do only one thing to save salmon in the Puyallup River, it would be doing these kinds of projects," said Ladley. Dikes along the Puyallup River cut off much of what once was valuable rearing habitat for juvenile salmon.

'We've been diking the Puyallup River for a century; we've only been trying to take the cork out for a few years.'

– Russ Ladley
Resource Protection Manager
Puyallup Tribe

The diking of the river was intended to prevent flooding, but in the end has harmed salmon populations by intensifying the effects of floods. "Before the dikes, high winter water was able to spread peacefully across the floodplain," said Ladley. "Now floods are forced to stay between the dikes, increasing the damage they can do. It's like putting your finger on the end of a hose.

"In addition to cutting off hundreds of acres of salmon rearing habitat, dikes also intensify floods that scour gravel where salmon lay their eggs," said Ladley. "Increasing the amount of off-channel habitat will not only restore the natural function of the river, it will mean more salmon will return to the Puyallup River every year."

The project was funded through state Salmon Recovery Funding Board and natural resource damage assessment funds. The property being restored is owned by Pierce County.

Similar off-channel projects on the river, such as moving levees away from the river banks, help alleviate the shortage of salmon habitat on the Puyallup. But, there is still a long way to go, said Ladley. "We've been diking the Puyallup River for a century; we've only been trying to take the cork out for a few years."

– E. O'Connell

Puyallup River Fast Facts

- Four species of salmon – chinook, coho, pink and chum – in addition to several species of trout, live in the Puyallup River.
- The Puyallup River originates from the Puyallup and Tahoma glaciers on the west and southwest slopes of Mount Rainier; the river flows northwesterly through the Puyallup Valley to Commencement Bay.
- Tributaries to the Puyallup include the Carbon, White and South Prairie rivers.

On Makah Reservation

Eagles Thrive With Protected Habitat

Bald eagle populations on the Makah Indian reservation are thriving because of a comprehensive resource management plan that protects high-quality habitat.

Each spring, tribal biologists make two helicopter flights across the Makah Tribe's lands on the northwest tip of the Olympic Peninsula. On the first flight, biologists tally the total number of nests with close attention paid to adults sitting on eggs. The second flight a couple of months later counts the number of young eagles to gauge nesting success.

"This year, we surveyed 26 eagle territories on the reservation," said Rob McCoy, wildlife biologist for the Makah Tribe. Of the 26 territories, biologists found eagles nesting on 19 nest sites. During the late spring flights, one or two young eagles were seen in 11 of those nests. "The number of nestlings produced at successful territories was 1.6, which is about average for the population out here. The productivity of the area meets the bald eagle recovery goals for the Pacific states region," said McCoy.

'The majority of high-quality bald eagle habitat here is protected.'

– Rob McCoy
Wildlife Biologist
Makah Tribe

The Makah Tribe has a centuries-old relationship with the bald eagle. Survey flights help protect the bird by providing long-term data on productivity, individual nest and territory use, and identification of new territories. The information also helps the tribe protect bald eagles when planning timber harvests or other activities. The tribe and former Washington Department of Wildlife began bald eagle surveys in 1981; in 1999 the tribe took over the surveys of their lands.

An adult eagle guards her young in a nest near Neah Bay.
Photo: D. Preston

Eagles mate for life, although if a partner dies, the survivor will mate again. Females usually produce two eggs, but up to four eggs are occasionally seen. However, usually only one or two survive to fledge from successful nests. Nests are an average of 5 feet in diameter, but can be as large as 10 feet in diameter.

Populations of eagles have rebounded dramatically since 1972 when the pesticide DDT was banned. The bird has also benefited from protection as a "threatened species" under the federal Endangered Species Act. Eagles are slated for removal from the list this year although it will likely remain listed as "sensitive" under state law.

"The majority of high-quality bald eagle habitat here is protected," said McCoy. "The fact that we have 26 territories on 30,000 acres shows how well the Makah timber management plan works." – *D. Preston*

Off-channel Habitat Focus Of Upper Skagit Tribe Study

The Upper Skagit Tribe will research critical needs for salmon in the Skagit River watershed this year, funded by a new $12,000 grant from the Department of the Interior.

"In order to use our limited salmon recovery dollars most effectively, we need information about the area we're working with," said Scott Schuyler, natural resources policy coordinator for the Upper Skagit Tribe. "Knowing where essential habitat for salmon exists enables us to protect that habitat."

The study will identify off-channel habitat restoration sites in the Skagit basin. Off-channel habitat areas, such as groundwater channels and small streams running in "relic" channels that are distinct from a river's main stem, are essential factories producing fish, especially coho and chinook salmon. Skagit River chinook are listed as "threatened" under the federal Endangered Species Act.

"The idea is to look at the whole picture, and this data will allow us to do that," said Schuyler. "Based on what we learn, we can direct available salmon recovery funds to their best possible application." – *J. Shaw*

Nisqually Tribe Restoring Critical Chinook Refuge

Jeanette Dorner, salmon recovery manager for the Nisqually Indian Tribe, examines newly constructed logjams on the Mashel River that will provide salmon habitat. *Photo: E. O'Connell*

It's always good to have a backup plan. For chinook salmon in the Nisqually River, their backup plan consists of tributaries such as the Mashel River.

"If something catastrophic happened on the Nisqually River, the chinook that would repopulate the Nisqually would come from major tributaries like the Mashel River," said Jeanette Dorner, salmon restoration manager for the Nisqually Tribe. It's this backup plan that's driving the Nisqually Tribe and the South Puget Sound Salmon Enhancement Group (SPSSEG) to restore habitat on the Mashel.

The tribe and the enhancement group are building logjams on the Mashel, an important feature for juvenile and migrating adult salmon. "Without trees in the river creating logjams, the river will become a hard place for salmon to live," said Florian Leischner, salmon recovery biologist for the Nisqually Tribe. Logjams also trap spawning gravel and create pool habitat. "Logs build places for adult salmon to rest and juvenile salmon to feed and hide from predators," said Leischner.

While all species of fish will benefit from the restoration, chinook and coho salmon and steelhead trout will get the most out of the project, said Leischner. Chinook and coho spend much of their time during their juvenile life-stage rearing near logjams. Chinook salmon in the Nisqually River watershed are listed as "threatened" under the federal Endangered Species Act.

Logging near the Mashel River interrupted the natural process that used to form logjams. Typically, large conifers along the riverbank were washed into the riverbed during floods. Most conifers, though, have been cut down and hardwood deciduous trees, such as alders, have replaced them. "Alders decay in water relatively quickly; they don't form logjams," said Teresa Moon, project manager for SPSSEG.

The tribe and group will also plant conifers along the Mashel to help restart the natural development of logjams. "It would be shortsighted of us to simply plop logs in the river and hope that it solves the problem," said Leischner. "By planting trees along the river, we're helping recreate what was here."

The tribe and the enhancement group have also been surveying salmon habitat on the Mashel for the past two years so that they can track how the river and salmon react to restoration. "We're going to take what we learn on the Mashel River and apply it to future restoration projects," said Moon.

"If chinook salmon are going to return to the Nisqually River in historic numbers, we need to make sure that there is a place for them to go," said Dorner. – *E. O'Connell*

Study Looks At Importance Of Small Streams

Many of the tiny tributary streams trickling through the hills of western Washington may not bear fish, but they are important sources of water, wood and spawning gravel needed for healthy, salmon-producing rivers.

Yet these smaller streams don't receive the same level of protection as other streams do.

Tribal scientists in the North Sound are researching these small streams, documenting their essential functions, and studying whether stricter protections are needed.

"Though the streams we're looking at don't produce fish, they do contribute to the ecology of the region in several ways," said David Luzi, a geomorphologist with the Tulalip Tribes.

Biologists from the Tulalip Tribes, the Nooksack Tribe and the Skagit River System Cooperative are studying old growth, second growth and third growth tree stands near streams in the Nooksack, Stillaguamish and Skagit basins. The Skagit River System Cooperative (SRSC) is the natural resources arm of the Swinomish and Sauk-Suiattle tribes.

To protect salmon, loggers and developers are required to leave a buffer zone between their work and the river systems that produce salmon. But regulations adopted under the Forests and Fish agreement — a consensus-based forum involving tribes, the state, the timber industry and environmental leaders in managing state and private timberlands — offer lesser protection for streams that do not produce fish. Logging can occur much closer to these creeks than others.

Under the Forests and Fish rules, perennial streams that don't produce fish are only required to have buffers for half their length – the other half remains unprotected. Seasonal non-fish-bearing streams receive no buffers at all.

"Our research will help determine the best course to take in protecting these streams," said Curt Veldhuisen, a hydrologist with SRSC. "Tougher regulations might be needed to protect fish and wildlife, and this work will help determine that."

The research began this summer and continues through next year. – *J. Shaw*

Tribe Repairs Habitat Damage From Flood

The roar began at 3 a.m. By the time the flood had subsided four hours later, a 10-foot wall of water had scoured Colony Creek with sufficient force to sweep away a nearby resident's car, depositing the small import automobile atop a large logjam 800 feet downstream.

Beaver dams are usually beneficial to salmon. But when a huge dam burst on Colony Creek, near Chuckanut Mountain in Whatcom County, the 10 acres of 10-foot-deep water formerly held back blew out a wide swath of the salmon stream. The flood devastated fish habitat, forcing fallen trees and spawning gravel up out of the water and onto surrounding banks.

Because of this February 2003 event, miles of productive fish habitat have been destroyed or made inaccessible to the multiple species of salmon and trout in the area. Over the summer, the Upper Skagit Indian Tribe fixed that.

"Colony Creek was a very productive salmon stream for its size," said Doug Couvelier, a biologist with the Upper Skagit Tribe. "But fish need large woody debris and the right size of gravel for spawning and rearing habitat. For healthy fish, we knew we needed to get wood back into the stream."

Throughout late July and early August, a tribal crew moved fallen cedar, alder and hemlock logs back into the stream to replace the wood that rising waters removed. Besides that, they'll remove significant barriers to fish passage, ensuring that natural flow patterns return to Colony Creek.

"Before the flood, this was loaded with coho fry," said Couvelier, pointing toward the upper portion of the creek. In addition to removing the logjams where young fish like to seek refuge, the waters created a blockade that stopped adult salmon from making the journey home to spawn.

Upper Skagit tribal fisheries technicians place a log in Colony Creek to repair salmon habitat. *Photo: J. Shaw*

When floods rush through creeks, they carry soil and other sediments with them. In this case, the flood's power replaced spawning gravel with hard, useless clay and suffocatingly fine sediment. Plus, the waters forced an enormous pile of silt up against a defunct wood bridge, blocking salmon from returning to their spawning grounds.

While years past saw many adult fish reaching the upper portions of Colony Creek, none made it past the bridge this past season. The flood, Couvelier said, effectively eliminated two miles of fish habitat.

In mid-August, though, salmon will once again have a chance to traverse this important stream. Colony Creek is one of the few independent streams in the area – meaning it drains directly to marine waters. The 11-mile creek gives sea-run cutthroat trout, chinook, coho and chum salmon a home before leading the fish to Samish Bay and the open sea.

"Spawning and rearing habitat is crucially important for salmon recovery, and this work will solve a lot of habitat problems for fish," said Scott Schuyler, natural resources policy coordinator for the Upper Skagit Tribe. "Putting wood back into the system will provide cool, calm pools for fish; restoring the creek's normal functions will prevent sediment from smothering salmon nests."

The project is funded by a $23,400 grant from the state Department of Ecology.

– J. Shaw

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